

## WIRING FOR SPACE APPLICATIONS PROGRAM

Ahmad Hammoud  
Sverdrup Technology, Inc.  
Cleveland, Ohio

**N94- 28708**

### INSULATION TESTING AND ANALYSIS

- IDENTIFY AND PRIORITIZE NASA WIRING REQUIREMENTS
- SELECT CANDIDATE WIRING CONSTRUCTIONS
- DEVELOP TEST MATRIX AND FORMULATE TEST PROGRAM
- MANAGE, COORDINATE, AND CONDUCT TESTS
- ANALYZE AND DOCUMENT DATA. ESTABLISH GUIDELINES AND RECOMMENDATIONS

### TEST PROGRAM

#### CANDIDATE SYSTEMS:

• FILOTEX	• M 81381
• THERMATICS	• M 22759
• TENSOLITE	• SILICONE RUBBER
• GORE	• TEFLON

#### CONFIGURATION:

- MIL-W-81381 & MIL-W-22759 CONSTRUCTIONS
- AWG: #12, #20
- SINGLE WIRE
- TWISTED PAIR
- BUNDLING

## WIRING CONSTRUCTIONS

<u>SAMPLE</u>	<u>INSULATION SYSTEM</u>
FILOTEX	PTFE / PI / FEP
THERMATICS	PTFE / PI / PTFE
TENSOLITE	PTFE / PI / PTFE
GORE	PTFE / HS PTFE / PTFE
81381	FEP / PI
22759	XL - TEFZEL (ETFE)
SILICONE RUBBER	SILICONE RUBBER
TEFLON	TFE

## PARTICIPATING ORGANIZATIONS

- McDONNELL AEROSPACE COMPANY
- NASA LeRC: ELECTRO-PHYSICS BRANCH  
MICROGRAVITY COMBUSTION BRANCH
- NASA JSC: WHITE SANDS TEST FACILITY
- NASA MSFC: MATERIALS & PROCESSES LABORATORY  
SPACE ENVIRONMENTAL EFFECTS LABORATORY
- NASA GSFC: PARTS PROJECT OFFICE (NPPO)
- NAVAL AIR WARFARE CENTER (NAWC)
- UNIVERSITY AT BUFFALO

## TEST PLAN

### McDONNELL AEROSPACE COMPANY

- AC CORONA
- TIME / CURRENT TO SMOKE
- WIRE FUSE TIME
- ABRASION & FLEX LIFE
- DYNAMIC CUT-THROUGH

### NASA LeRC ELECTRO-PHYSICS BRANCH

- I & V LEVELS TO INITIATE & SUSTAIN ARC TRACKING
- DC & AC (400 Hz, 20 kHz)
- VACUUM ( $10^{-6}$  TORR) AND TEMPERATURE (200° C)

### NASA MICROGRAVITY COMBUSTION BRANCH

- IGNITION, FLAMING, SPREAD RATE
- OFFGASSING, SMOKING, TOXICITY
- NORMAL (1g) AND LOW GRAVITY ( $10^{-2}$  g)
- OXYGEN, VACUUM, TEMPERATURE

### NASA JSC WHITE SANDS TEST FACILITY

- FLAMMABILITY
- ODOR, OFFGASSING
- THERMAL VACUUM STABILITY
- RESISTANCE TO AEROSPACE FLUIDS

### NASA MSFC MATERIALS AND PROCESSES LAB

- FLAMMABILITY & ARC TRACKING
- OXYGEN, HIGH TEMPERATURE, VACUUM

### NASA MSFC SPACE ENVIRONMENTAL EFFECTS LAB

- THERMAL / ATOMIC OXYGEN EXPOSURE
- ULTRAVIOLET RADIATION, VACUUM
- COMBINED STRESSING (LEO)

### UNIVERSITY AT BUFFALO

- DC & 400 Hz BREAKDOWN STRENGTH
- INSULATION RESISTANCE WITH TEMPERATURE
- MULTI-STRESS

### NASA GSFC AND NAWC

- TEST COORDINATION
- QUALIFICATION & CERTIFICATION

## PLANNED ACTIVITIES

- DOWN-SELECT WIRING CANDIDATES
- DEVELOP TEST MATRIX
- INVESTIGATE NEW CONSTRUCTION / MATERIALS:
  - TRW PFPI
  - 3M FPE FILM
  - FOSTER MILLER PBZT POLYMERS
  - ICI UPLEX